Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

Total hip arthroplasty (THA) and/or total knee arthroplasty (TKA): hospital-level, risk-standardized payment associated with a 90-day episode of care for elective primary THA and/or TKA.

Source(s)

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 measure updates and specifications report: hospital-level risk-standardized payment measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 94 p.

Measure Domain

Primary Measure Domain

Related Health Care Delivery Measures: Cost

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure estimates hospital-level, risk-standardized payment (RSP) for an elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) episode of care starting with inpatient admission to a short term acute-care hospital and extending 90 days post-admission for Medicare Fee-for-Service (FFS) patients discharged from the hospital following an elective primary THA/TKA procedure.

The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for individuals who are 65 years and older and are Medicare Fee-for-Service (FFS) beneficiaries hospitalized in non-federal short-term acute care hospitals (including Indian Health Services hospitals) and critical access hospitals.

Rationale

In 2012, total Medicare expenditures were $574.2 billion, representing 3.6% of gross domestic product (GDP) (Centers for Medicare and Medicaid Services [CMS], 2014). Current estimates suggest that Medicare

spending will increase to 5.6% of GDP by 2040 due to both an increase in the Medicare population as well as an increase in Medicare spending on each beneficiary (CMS, 2014). The growth in Medicare spending is unsustainable and highlights the need to create incentives for high-value care. A critical first step in moving toward high-value care is to define an approach to calculate costs that is transparent to consumers and fair to providers. This measure uses standardized payments to reflect differences in the management of care for patients with an elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) both during hospitalization and after discharge.

Payments, however, are difficult to interpret in isolation. Some high-payment hospitals may have better clinical outcomes when compared with low-payment hospitals; other high-payment hospitals may not. In an effort to identify practice patterns that may be expensive without conferring a quality benefit, the THA/TKA payment measure specifications are aligned with current quality-of-care measures, such as CMS's 90-day THA/TKA complication measure. In this way, the measure can facilitate the profiling of hospital value and encourage the most efficient delivery of high-quality care.

A payment measure that fairly profiles hospitals by adjusting for hospital case mix and that standardizes payments for geography is congruent with national efforts to increase the transparency of our healthcare system. Although the THA/TKA payment measure is not intended to be used in payment programs, it can provide key insights into those systems of care at hospitals that provide high value as a patient moves from the inpatient to the outpatient setting when interpreted in the context of CMS's THA/TKA complication measure. Because the payment measure spans an episode of care, it is complementary to and may uniquely inform innovative payment models such as bundled payments and Accountable Care Organizations (ACOs), both of which seek to improve healthcare value by optimizing the coordination of care across care settings (CMS, 2013).

THA/TKA provides a suitable environment for optimizing value across an episode of care, as there are many opportunities to improve value for pre-, peri-, and post-operative care. Ultimately, clinical outcomes for THA and TKA depend not just on the surgeon performing the procedure, but on care coordination across provider groups and specialties, as well as the patient's engagement in his or her recovery. The goal of hospital-level resource use measurement is to capture the full spectrum of care in order to incentivize collaboration and shared responsibility for improving patients' health and reducing the burden of their procedure.

Evidence for Rationale

Centers for Medicare & Medicaid Services (CMS). Bundled payments for Care Improvement (BPCI) Initiative fact sheet. [internet]. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2013 Aug

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research & Evaluation (CORE). Hospital-level, risk-standardized payment associated with a 90-day episode of care for elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) (version 1.0): 2014 measure methodology report. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2014 Dec. 79 p. [23 references]

Primary Health Components

Total hip arthroplasty (THA); total knee arthroplasty (TKA); 90-day episode of care payment

Denominator Description

The measure cohort includes acute inpatient admissions for Medicare Fee-for-Service (FFS) beneficiaries aged 65 years or older discharged from non-federal acute care hospitals and critical access hospitals, having a qualifying elective primary total hip arthroplasty (THA) or total knee arthroplasty (TKA)

procedure.

The risk-standardized payment (RSP) is calculated as the ratio of the "predicted" payment to the "expected" payment at a given hospital, multiplied by the national mean payment. For each hospital, the denominator is the payment expected based on the nation and the specific hospital's case mix.

See the related "Denominator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the measure cohort.

See the *2017 Measure Updates and Specifications Report: Hospital-level Risk-standardized Payment Measures* for more details.

Numerator Description

The measure reports total payments associated with an episode of care for total hip arthroplasty (THA)/total knee arthroplasty (TKA).

The risk-standardized payment (RSP) is calculated as the ratio of the "predicted" payment to the "expected" payment at a given hospital, multiplied by the national mean payment. For each hospital, the numerator of the ratio is the payment predicted based on the specific hospital and its observed case mix.

See the related "Numerator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the *2017 Measures Updates and Specifications Report: Hospital-level Risk-standardized Payment Measures* for more details.

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Total hip arthroplasty (THA) and total knee arthroplasty (TKA) are common procedures among elderly patients with substantial range in costs of care likely due to different practice patterns (Sood et al. 2011). A hospital-level, episode-of-care payment measure for THA and TKA is informative for a number of reasons. First, it provides transparency into the differences in costs to Medicare for the same procedures across hospitals. Second, it allows hospitals to assess the payments for patients admitted to their institution relative to other hospitals and thus may incentivize hospitals to examine their own practices and coordinate with post-discharge providers to seek new efficiencies. Finally, when paired with existing outcome measures for THA/TKA patients, it identifies institutions that, after removing the effect of geography, policy adjustments, and case mix, demonstrate good patient outcomes at low cost. Such hospitals may provide important examples of positive deviance from which other hospitals can learn.

Quality measures for THA/TKA, such as the 90-day risk-standardized complication rate (RSCR) following THA/TKA, are already publicly reported. In the context of its publicly reported quality measures, THA/TKA is an ideal procedure in which to assess payments for Medicare patients and relative hospital value. Therefore, we created a measure of payments for a 90-day episode of care for THA/TKA that could be aligned with Centers for Medicare & Medicaid Services' (CMS's) 90-day THA/TKA complication measure. This will allow CMS to assess the value of care provided for these episodes.

Evidence for Additional Information Supporting Need for the Measure

Sood N, Huckfeldt PJ, Escarce JJ, Grabowski DC, Newhouse JP. Medicare's bundled payment pilot for acute and postacute care: analysis and recommendations on where to begin. Health Aff (Millwood). 2011 Sep;30(9):1708-17. PubMed

Extent of Measure Testing

Assessment of Updated Models

The total hip arthroplasty (THA)/total knee arthroplasty (TKA) payment measure estimates hospital-specific episode-of-care risk-standardized payment (RSPs) using hierarchical generalized linear models. Refer to Section 2 in the original measure documentation for a summary of the measure methodology and model risk-adjustment variables. Refer to prior methodology and technical reports for further details.

The Centers for Medicare & Medicaid Services (CMS) evaluated and validated the performance of the THA/TKA model using April 2013 to March 2016 data for the 2017 reporting period. They also evaluated the stability of the risk-adjustment model over the three-year measurement period by examining the model variable frequencies, model coefficients, and the performance of the risk-adjustment model in each yea

CMS assessed generalized linear model performance in terms of discriminant ability for each year of data and for the three-year combined period. Two summary statistics for assessing model performance were computed: the predictive ratio and a quasi-R^2. For a traditional linear model (that is, ordinary least squares regression), R^2 is interpreted as the amount of variation in the observed outcome that is explained by the predictor variables (patient-level risk factors). Generalized linear models, however, do not output an R^2 that is akin to the R^2 of a traditional linear model. A "quasi-R^2" was produced by regressing the total payment outcome on the predicted outcome. Specifically, CMS regressed the total payment on the payment predicted by the patient-level risk factors.

The results of these analyses are presented in Section 4.5 of the original measure documentation.

THA/TKA Payment 2017 Model Results

Frequency of THA/TKA Model Variables

CMS examined the change in the frequencies of clinical and demographic variables. Frequencies of model variables were stable over the measurement period. There were no notable changes (greater than 2% absolute change) in the frequencies.

THA/TKA Model Parameters and Performance

Table 4.5.2 in the original measure documentation shows the hierarchical generalized linear regression model variable coefficients by individual year and for the combined three-year dataset. Table 4.5.3 in the original measure documentation shows the risk-adjusted PRs and 95% confidence intervals for the THA/TKA payment model by individual year and for the combined three-year dataset. The quasi-R^2 for the THA/TKA payment model was 0.21, suggesting that approximately 21% of the variation in payment can be explained by patient-level risk factors. This quasi-R^2 is in line with R^2s from other patient-level risk-adjustment models for healthcare payment (Pope et al., 2011).

Overall, the variable effect sizes were relatively constant across years. In addition, model performance was stable over the three-year time period; the quasi-R^2 and predictive ratios remained similar to the model used during development.

Refer to the original measure documentation for additional information.

Evidence for Extent of Measure Testing

Pope G, Kautter J, Ingber M, Freeman S, Sekar R, Newhard C. Evaluation of the CMS-HCC risk adjustment model: final report. Research Triangle Park (NC): RTI International; 2011 Mar. 119 p.

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 measure updates and specifications report: hospital-level risk-standardized payment measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 94 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Specified

Target Population Age

Age greater than or equal to 65 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Affordable Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Not within an IOM Care Need

IOM Domain

Not within an IOM Domain

Data Collection for the Measure

Case Finding Period

Discharges April 1, 2013 through March 31, 2016

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Institutionalization

Patient/Individual (Consumer) Characteristic

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

An *index admission* is the hospitalization that begins the episode-of-care payment window and includes admissions for patients:

- Having a qualifying elective primary total hip arthroplasty (THA)/total knee arthroplasty (TKA) procedure during the index admission*
- Enrolled in Medicare Fee-for-Service (FFS) Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A and Part B during the index hospitalization
- Aged 65 or over
- Not transferred from another acute care facility

Elective primary THA/TKA procedures are defined as those THA/TKA procedures *without* any of the following:

- Fracture of the pelvis or lower limbs coded in the principal or secondary discharge diagnosis fields of the index admission;
- A concurrent partial hip arthroplasty procedure;
- A concurrent revision, resurfacing, or implanted device/prosthesis removal procedure;
- Mechanical complication coded in the principal discharge diagnosis field; or,
- Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field.

*International Classification of Diseases, Tenth Revision, Procedure Coding System (ICD-10-PCS) codes used to identify the THA/TKA procedures for discharges on or after October 1, 2015:

0SR9019 Replacement of Right Hip Joint with Metal Synthetic Substitute, Cemented, Open Approach
0SR901A Replacement of Right Hip Joint with Metal Synthetic Substitute, Uncemented, Open Approach
0SR901Z Replacement of Right Hip Joint with Metal Synthetic Substitute, Open Approach
0SR9029 Replacement of Right Hip Joint with Metal on Polyethylene Synthetic Substitute, Cemented, Open Approach
0SR902A Replacement of Right Hip Joint with Metal on Polyethylene Synthetic Substitute, Uncemented, Open Approach
0SR902Z Replacement of Right Hip Joint with Metal on Polyethylene Synthetic Substitute, Open Approach
0SR9039 Replacement of Right Hip Joint with Ceramic Synthetic Substitute, Cemented, Open Approach
0SR903A Replacement of Right Hip Joint with Ceramic Synthetic Substitute, Uncemented, Open Approach
0SR903Z Replacement of Right Hip Joint with Ceramic Synthetic Substitute, Open Approach
0SR9049 Replacement of Right Hip Joint with Ceramic on Polyethylene Synthetic Substitute, Cemented, Open Approach
0SR904A Replacement of Right Hip Joint with Ceramic on Polyethylene Synthetic Substitute, Uncemented, Open Approach
0SR904Z Replacement of Right Hip Joint with Ceramic on Polyethylene Synthetic Substitute, Open Approach
0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach
0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach
0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach
0SRB019 Replacement of Left Hip Joint with Metal Synthetic Substitute, Cemented, Open Approach
0SRB01A Replacement of Left Hip Joint with Metal Synthetic Substitute, Uncemented, Open Approach
0SRB01Z Replacement of Left Hip Joint with Metal Synthetic Substitute, Open Approach
0SRB029 Replacement of Left Hip Joint with Metal on Polyethylene Synthetic Substitute, Cemented, Open Approach
0SRB02A Replacement of Left Hip Joint with Metal on Polyethylene Synthetic Substitute, Uncemented, Open Approach
0SRB02Z Replacement of Left Hip Joint with Metal on Polyethylene Synthetic Substitute, Open Approach
0SRB039 Replacement of Left Hip Joint with Ceramic Synthetic Substitute, Cemented, Open Approach
0SRB03A Replacement of Left Hip Joint with Ceramic Synthetic Substitute, Uncemented, Open Approach
0SRB03Z Replacement of Left Hip Joint with Ceramic Synthetic Substitute, Open Approach
0SRB049 Replacement of Left Hip Joint with Ceramic on Polyethylene Synthetic Substitute, Cemented, Open Approach
0SRB04A Replacement of Left Hip Joint with Ceramic on Polyethylene Synthetic Substitute, Uncemented, Open Approach
0SRB04Z Replacement of Left Hip Joint with Ceramic on Polyethylene Synthetic Substitute, Open Approach
0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach
0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach
0SRB0JZ Replacement of Left Hip Joint with Synthetic Substitute, Open Approach
0SRC0J9 Replacement of Right Knee Joint with Synthetic Substitute, Cemented, Open Approach
0SRC0JA Replacement of Right Knee Joint with Synthetic Substitute, Uncemented, Open Approach
0SRC0JZ Replacement of Right Knee Joint with Synthetic Substitute, Open Approach
0SRD0J9 Replacement of Left Knee Joint with Synthetic Substitute, Cemented, Open Approach
0SRD0JA Replacement of Left Knee Joint with Synthetic Substitute, Uncemented, Open Approach
0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach

Note: International Classification of Diseases, Ninth Revision (ICD-9) code lists for discharges prior to October 1, 2015 can be found in the *2016 Measures Updates and Specifications Report: Hospital-level Risk-standardized Payment Measures* .

Exclusions

- Discharged against medical advice (AMA)
- Incomplete administrative data in the 90 days following the start of the index admission if discharged alive
- Transferred to a federal hospital

With more than two THA/TKA procedure codes during the index admission
Not matched to admission in the THA/TKA complication measure
Missing index diagnosis-related group (DRG) weight where provider received no payment

For patients with more than one eligible admission for THA/TKA in a single year, only one index admission for that procedure is randomly selected for inclusion in the cohort. Additional admissions within that year are excluded.

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions
The measure reports total payments associated with an episode of care for total hip arthroplasty (THA)/total knee arthroplasty (TKA).

The measure captures payments for Medicare patients across multiple care settings, services, and supplies (that is, inpatient, outpatient, skilled nursing facility [SNF], home health, hospice, physician/clinical laboratory/ambulance services, durable medical equipment, prosthetics/orthotics, and supplies).

The risk-standardized payment (RSP) is calculated as the ratio of the "predicted" payment to the "expected" payment at a given hospital, multiplied by the national mean payment. For each hospital, the numerator of the ratio is the payment predicted based on the specific hospital and its observed case mix.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the *2017 Measures Updates and Specifications Report: Hospital-level Risk-standardized Payment Measures* for more details.

Exclusions
Payment adjustments unrelated to clinical care decisions are not considered in the measure outcome

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

None

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Ratio

Interpretation of Score

Does not apply to this measure (i.e., there is no pre-defined preference for the measure score)

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

Risk-Adjustment Variables

In order to account for differences in case mix among hospitals, the measure adjusts for variables (for example, age, comorbid disease, and indicators of patient frailty) that are clinically relevant and have relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission.

The measure adjusts for case mix differences among hospitals based on the clinical status of the patient at the time of the index admission. Accordingly, only comorbidities that convey information about the patient at that time or in the 12 months prior, and not complications that arise during the course of the hospitalization, are included in the risk adjustment.

The measure does not adjust for socioeconomic status (SES) because the association between SES and health outcomes can be due, in part, to differences in the quality of healthcare that groups of patients with varying SES receive. The intent is for the measure to adjust for patient demographic and clinical characteristics while illuminating important payment differences.

Refer to Appendix D in the original measure documentation for the list of comorbidity risk-adjustment variables and list of complications that are excluded from risk adjustment if they occur only during the index admission.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Hospital-level RSP associated with a 90-day episode of care for elective primary THA and/or TKA.

Measure Collection Name

National Hospital Inpatient Quality Measures

Measure Set Name

Payment Measures

Submitter

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Developer

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Yale-New Haven Health Services Corporation/Center for Outcomes Research and Evaluation under contract to Centers for Medicare & Medicaid Services - Academic Affiliated Research Institute

Funding Source(s)

Centers for Medicare & Medicaid Services (CMS)

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Financial Disclosures/Other Potential Conflicts of Interest

None

Measure Initiative(s)

Hospital Compare

Hospital Inpatient Quality Reporting Program

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2017 Mar

Measure Maintenance

Annual

Date of Next Anticipated Revision

2018 Apr

Measure Status

This is the current release of the measure.

Measure Availability

Source available from the QualityNet Web site .

Check the QualityNet Web site regularly for the most recent version of the specifications manual and for

the applicable dates of discharge.

Companion Documents

The following are available:

Hospital compare: a quality tool provided by Medicare. [internet]. Washington (DC): U.S. Department of Health and Human Services; [accessed 2017 Nov 10]. Available from the Medicare Web site .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 Medicare hospital quality chartbook. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the CMS Web site .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 payment measures updates and specifications report: supplemental ICD-10 code lists for use with claims for discharges on or after October 1, 2015. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the QualityNet Web site .

NQMC Status

This NQMC summary was completed by ECRI Institute on December 4, 2017. The information was verified by the measure developer on December 12, 2017.

Copyright Statement

Production

Source(s)

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 measure updates and specifications report: hospital-level risk-standardized payment measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 94 p.

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